

## LUNG COMPLICATIONS AFTER ELECTIVE HIP SURGERY

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A total of 350 patients undergoing elective hip surgery were retrospectively studied as regards pulmonary complications. The study is based on the findings of pre- and postoperative chest X-rays and of pulmonary perfusion scintigrams.

Twenty-seven per cent of the patients had pulmonary complications of some kind. Twelve per cent had a change in the postoperative as compared to the preoperative X-ray, though most of the changes were minute. In 15.4 per cent there were scintigraphic signs of pulmonary embolism and of these 30 per cent had signs or symptoms of pulmonary embolism; 1.7 per cent of the patients had symptoms of pulmonary infectious disease. Two patients died from pulmonary embolism. The study shows a low frequency of serious pulmonary complications after elective hip surgery.

*Key words:* hip prosthesis; lung diseases; postoperative complications; pulmonary embolism

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Postoperative lung complications are an important problem after all kinds of surgery. The highest incidence is seen after surgery of the thorax and upper abdomen whereas these complications are less frequent after surgery of the lower abdomen and the limbs.

This paper is concerned with pulmonary complications after elective hip surgery and is based on the findings of pre- and postoperative chest X-ray examinations and pulmonary perfusion scintigrams.

### PATIENTS AND METHODS

A total of 350 patients subjected to elective hip surgery were analysed; 159 were men (45 per cent) and 191 women (55 per cent) with a mean age of 68.0 years (range 49 to 87 years).

The patients were all taking part in two separate studies concerning prophylaxis against postoperative thromboembolism (Bergqvist et al. 1979, Bergqvist & Hallböök 1980). The type of prophylaxis given is recorded in Table 3.

All patients received preoperative information on respiratory physiotherapy and all were mobilized as soon as possible after operation, usually on the first postoperative day.

During the operation 173 patients (49 per cent) had an epidural analgesia and 177 (51 per cent) had a neurolept anaesthesia; 316 patients had a total hip replacement with a Brunswik prosthesis and 26 with a Moore prosthesis; seven had a MacMurray osteotomy and one removal of a Charnley prosthesis.

All patients had a preoperative chest X-ray taken with frontal and lateral projections and this investigation was repeated on the seventh postoperative day. All patients had a postoperative perfusion pulmonary scintigram on the seventh postoperative day and 150 also had a preoperative scintigram. Scintigraphy was performed with an injection of 2  $\mu$ Ci of  $^{99}\text{Tc}$ -labelled macroaggregated albumin i.v. Frontal, dorsal and both lateral projections were recorded with a gamma camera.

Of the patients with only a postoperative scintigram a segmental perfusion defect was regarded as pulmonary embolism whereas irregular perfusion was considered as a possible pulmonary embolus. When both pre- and postoperative scintigrams were taken a segmental perfusion defect in the postoperative scintigram that was not found in the preoperative investigation was consid-

ered as pulmonary embolism while a change from a normal scintigram to a scintigram with irregular perfusion was considered as a possible pulmonary embolus.

Clinical signs of pulmonary embolism and other pulmonary diseases were noted. Sudden dyspnoea or chest pain without ECG changes indicating other causes or transaminase changes were regarded as signs of pulmonary embolism.

## RESULTS

A normal preoperative chest X-ray was recorded in 326 patients (96 per cent) and 24 patients (4 per cent) had pathological changes of some kind (Table 1).

In 309 patients (88 per cent) the postoperative X-rays were normal or unchanged compared with those taken preoperatively, and in 41 patients changes were seen (Table 2). The different types of prophylaxis the patients received did not cause differences in their lung complication patterns seen on X-ray (Table 3).

Out of the 200 patients in whom only a postoperative scintigram was performed, 35 had pulmonary embolism while 12 had possible pulmonary embolism.

Eight patients had clinical signs of pulmonary embolism, seven with segmental perfusion defects and one with an irregular perfusion pattern. Nineteen patients out of the 150, that had both pre- and postoperative scintigrams performed, had new segmental defects in the postoperative scintigram and in 11 there was a change from a normal scintigram preoperatively to a postopera-

*Table 1. Preoperative changes in the chest X-rays*

|                           |    |
|---------------------------|----|
| Signs of old tuberculosis | 11 |
| Pleural adhesions         | 6  |
| Emphysema                 | 3  |
| Small atelectasis         | 2  |
| Bronchiectasis            | 1  |
| Stasis                    | 1  |
| Total                     | 24 |

*Table 2. Changes in the postoperative chest X-rays compared with the preoperative X-rays*

|                                             |    |
|---------------------------------------------|----|
| Small atelectasis                           | 19 |
| Pleural effusion                            | 9  |
| Parenchymal infiltration                    | 8  |
| Parenchymal infiltration + pleural effusion | 3  |
| Pleural adhesion                            | 1  |
| Mild stasis                                 | 1  |
| Total                                       | 41 |

tive scintigram with irregular perfusion. Of these patients, nine had symptoms of pulmonary embolism, four with minor changes in the scintigram and five with new segmental defects (Figure 1).

The lung complications did not differ significantly as a result of the different kinds of anaesthesia. Twenty-nine of the patients with pulmonary embolism had an epidural analgesia and 25 had a neurolept analgesia, and of the patients with chest X-ray changes 21 had an epidural and

*Table 3. Postoperative pulmonary complications in relation to the type of prophylaxis against thromboembolism*

|                                             | No prophylaxis | Dextran 70 | Low dose heparin | Low dose heparin + dihydroergotamin | PZ68B |
|---------------------------------------------|----------------|------------|------------------|-------------------------------------|-------|
| Total in group                              | 64             | 117        | 69               | 40                                  | 60    |
| Pulmonary embolism                          | 13             | 23         | 9                | 9                                   | 11    |
| Parenchymal infiltration                    | 2              | 1          | 1                | 3                                   | 1     |
| Parenchymal infiltration + pleural effusion | 0              | 2          | 1                | 0                                   | 0     |
| Pleural effusion                            | 2              | 4          | 0                | 2                                   | 1     |
| Atelectasis                                 | 4              | 5          | 2                | 3                                   | 5     |
| Total                                       | 21             | 35         | 13               | 17                                  | 18    |

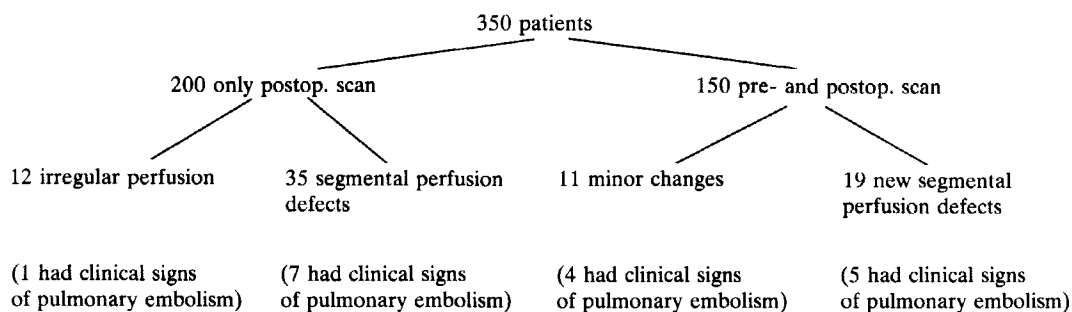


Figure 1. Pulmonary scintigrams.

Table 4. Postoperative pulmonary complications correlated with the type of anaesthesia

|                                             | Neurolept analgesia | Epidural analgesia |
|---------------------------------------------|---------------------|--------------------|
| Pulmonary embolism                          | 25                  | 29                 |
| Parenchymal infiltration                    | 3                   | 5                  |
| Parenchymal infiltration + pleural effusion | 1                   | 2                  |
| Pleural effusion                            | 6                   | 3                  |
| Atelectasis                                 | 8                   | 11                 |
| Stasis                                      | 1                   | 0                  |
| Pleural adhesion                            | 1                   | 0                  |

20 neurolept analgesia during operation (Table 4).

Nineteen (5.4 per cent) of the patients with changes in the postoperative chest X-ray had a small atelectasis that did not give any symptoms, 8 patients (2.2 per cent) had parenchymal infiltrations and 6 of these had symptoms of pneumonia which was treated without complications. Nine patients (2.6 per cent) had pleural effusion and of these four could be shown to have pulmo-

nary embolism or possible pulmonary embolism (Table 2).

The changes in the pulmonary X-ray examinations are shown in Figure 2. The pulmonary complications did not differ significantly between the sexes and did not depend on the age of the patient (Table 5).

## DISCUSSION

Elective hip surgery is a standardized operation. These patients have a high frequency of deep vein thromboses and thus a high risk of developing pulmonary embolism (Bergqvist et al. 1979, Nil- lius & Nylander 1979).

Surgery of the limbs does not give a high pulmonary complication rate except for pulmonary embolism (Thorén 1954). In a study regarding all complications after total hip replacement surgery in 189 patients, 2.1 per cent had postoperative pneumonia and 0.5 per cent pulmonary embolism (Visuri et al. 1977). This study was, however, not primarily concerned with pulmonary complications and these were not specially looked for;

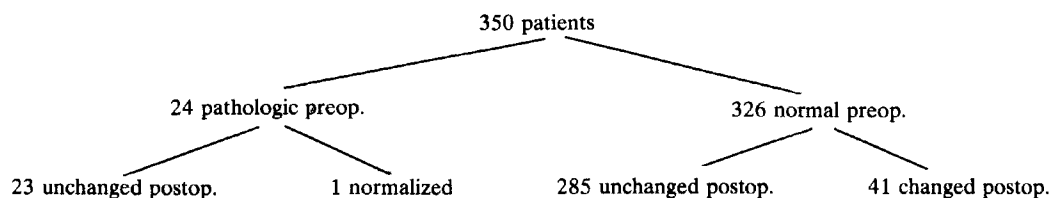


Figure 2. Chest X-ray examination.

Table 5. Age and sex distribution of patients with pulmonary complications

|                                           | Male       | Female     | Mean age |
|-------------------------------------------|------------|------------|----------|
| Whole material                            | 159        | 191        | 68.0     |
| Patients with pulmonary embolism          | 22 (13.8%) | 32 (16.7%) | 67.4     |
| Patients with possible pulmonary embolism | 12 ( 7.5%) | 11 ( 5.7%) | 66.4     |
| Patients with postop. X-ray changes       | 12 ( 7.5%) | 28 (14.6%) | 70.2     |

only complications causing symptoms were noted.

The present material is large and the patients very homogeneous as regards age. Patients with previous severe lung diseases are probably not included since "poor risk" patients would not have been operated on.

In 257 patients (73 per cent) there were no signs of pulmonary complications on the seventh postoperative day while 93 patients (27 per cent) had a pathological scintigram or X-ray. The high frequency of pulmonary complications could be explained by the fact that they were especially looked for. Most of these complications were however asymptomatic (76 per cent).

There are several factors that can theoretically give lung complications after hip surgery. Thrombosis and subsequent pulmonary embolism is one of the most important. Two patients in this material died from pulmonary embolism, one on the tenth postoperative day and the other on the fifteenth. The first of these patients had a pathological postoperative scintigram but a normal X-ray while the other had both a normal X-ray and a normal scintigram. Thus all pulmonary emboli are not detected with this screening method, on the seventh postoperative day. It has been shown that fatal pulmonary embolism can be delayed for several weeks after injury (Sevitt 1962, Johnson et al. 1977). It is interesting to note that some patients with only very discreet changes in the scintigrams had clinical signs of pulmonary embolism. This could mean that a minute change in the scintigram could indicate pulmonary embolism, at least if the change occurs between the pre- and postoperative scintigrams.

The type of anaesthesia is another factor which can affect lung complications although we could not demonstrate any difference in pulmonary

complications with the different types of anaesthesia. There are, however, other factors that can influence the choice of anaesthesia, e.g. bleeding and bleeding complications (Jacobsson & Wigren 1972).

The importance of pulmonary microembolism has been much discussed. Modig et al. (1975) found a transient and benign circulatory and pulmonary dysfunction during total hip replacement associated with platelet and fibrinogen microembolism in the lungs whereas the appearance of fat from the bone marrow in the circulation was of minor importance. The respiratory dysfunction was less pronounced after continuous epidural block as compared to postoperative parenteral analgesia. In this study, however, all patients had a normal postoperative chest X-ray and the changes that could be recorded were very limited in time (Modig 1976).

Infectious pulmonary complications are common in older patients and can be prevented to a great extent by early mobilization and vigorous physiotherapy (Thorén 1954). As mentioned earlier all patients in this material were mobilized early, usually on the first postoperative day. They also received information preoperatively regarding respiratory physiotherapy.

Only 1.7 per cent had postoperative pulmonary infectious complications causing symptoms.

The value of routine chest X-ray examinations pre- and postoperatively is doubtful. Thomsen et al. (1978), Meigaard et al. (1978) and Haubek & Cold (1978) found that a preoperative chest X-ray had therapeutic consequences in very few cases and the possibility of comparing the postoperative X-ray with the preoperative one did not change the postoperative therapy. Routine preoperative chest X-ray is not indicated unless the patient has signs or symptoms of pulmonary

or heart disease. However, in studies concerning the frequency of chest complications the preoperative chest X-ray is necessary.

The same seems to be true of pulmonary perfusion scintigrams. If pulmonary scintigrams are to be used for screening purposes it seems that a preoperative investigation is of great value in the assessment of the postoperative scintigram (Bergqvist et al. 1980). We do not, however, know what consequences an untreated silent pulmonary embolism has for the patient in the long run.

In conclusion, postoperative pulmonary complications after elective hip surgery occur in about 25 per cent of cases. Most complications are mild and do not affect the result of the operation or the postoperative period. Fatal pulmonary complications in this material occurred in 0.55 per cent.

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